Virtual gravitons.

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John Nash's idea reminded me of the Scharnhorst effect - a photon moves in a vacuum and is absorbed by virtual particles, which can lead to an electron-positron pair, which a little later, by annihilation, will create a similar photon (according to Nash, a photon traveling through the Universe loses its energy due to interaction with the gravitational field, that is, a specific “friction” occurs, etc. [1]).

But what if we assume that there is a rational grain in Nash's idea, and the photon reacts with gravitons. But, since the photon does not lose energy, then gravitons can only be virtual. That is, the gravitational interaction between particles is transmitted using virtual gravitons. From this it becomes completely clear why gravitons cannot be registered in the real world.

Since virtual gravitons can move with any speed, the gravitational interaction between bodies is transmitted virtually instantly (the speed of a virtual particle has no physical meaning and is determined by its momentum p; v = (p * c^2)/E; virtual gravitons transfer momentum, but do not transfer energy). This also explains quantum entanglement. But since energy cannot move at a speed greater than the speed of light, gravitational waves have the speed of light.

It is also interesting that virtual particles do not have a trajectory, since they are absorbed before they move a distance greater than the uncertainty of their position, and the distance of virtual interaction does not exceed the Compton wavelength of the carrier quantum. Processes involving virtual particles in different inertial reference systems can look completely different (one observer will see the emission of a virtual particle, and another - the absorption of this particle, etc.).

1. As a graduate student at Princeton, John Nash made a brief (but not very productive) foray into physics. Alessandro13. Extremely interesting facts. Quora. https://qr.ae/p2jMRq